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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,975	06/27/2005	Kiyohito Murata	07057.0105-00000	9214
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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			EXAMINER BALL, JOHN C	
			ART UNIT 4128	PAPER NUMBER
			MAIL DATE 01/23/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/540,975	<b>Applicant(s)</b> MURATA, KIYOHITO	
	<b>Examiner</b> J. CHRISTOPHER BALL	<b>Art Unit</b> 4128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) 1-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/27/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Summary***

1. This is the initial Office Action based on the MURATA National Stage Entry ("371") Application of PCT/IB03/06162 filed on December 23, 2003.
2. Claims 1-10 are currently pending and have been fully considered. Claims 11-15 were cancelled by preliminary amendment by applicant at time of filing National Stage Entry.

### ***Priority***

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Drawings***

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "1" and "21" have both been used to designate exhaust heat power generation apparatus in Figures 5 & 6. Additionally, reference characters "2A" and "22" have both been used to designate exhaust heat power generation units in Figure 5, and reference characters "2D" and "22" have both been used to designate exhaust heat power generation units in Figure 6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: element **5e** stated to be present in Figure 7A within the specification (page 8, line 12). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: element **20** shown in Figures 4 – 6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:
- The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
8. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
- Both Claims 1 and 2 recite in part, “. . . has a rigidity set to a highest value among . . .” various components. Rigidity is an inherent characteristic, not a variable characteristic to be set at a highest or any level. Rigidity can be defined

as resistance to change, which could encompass many characteristic that could measured for the components (e.g., tensile strength, Young's modulus, heat capacity, etc.), and therefore the way in which the term is recited in Claims 1 and 2 renders these claims indefinite. The substance with the highest rigidity has been interpreted to mean the substance which has the greatest qualitative hardness when comparing two or more substances with the same thickness or volume.

Claims 3-10 are rejected as being dependent on rejected Claims 1 or 2.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-4, and 8-10 rejected under 35 U.S.C. 103(a) as being unpatentable over KATSUMI et al. (Japanese Patent Publication H11-122960, A).

KATSUMI et al. discloses an exhaust heat electrical generating apparatus comprised of a thermoelectric converting unit that converts thermal energy of exhaust gas into electrical energy (element 33 in Drawing 2), a heat exchange unit (elements 21 and 19 in Drawing 2) on one surface of the thermoelectric converting unit to conduct thermal energy from the exhaust gas that follow through an exhaust pipe (paragraph [0015]), and a cooling unit on the other surface of the thermoelectric converting unit (element 13a in Drawing 2), which are limitations recited in Claim 1. KATSUMI et al. does not specifically recite compositions of material for the thermoelectric converting unit, the heat exchange unit, or the cooling unit to make an explicit determination that the cooling unit has the highest rigidity among these components. However, KATSUMI et al. does teach that the heat exchange unit can be fabricated from a number of metals (paragraph [0063]). From this teaching, it would be obvious to one with ordinary skill in the art that the heating unit could be made of a material with less rigidity than the cooling unit, and that the typical material utilized to fabricate the thermoelectric conversion unit, semiconductor material, would also be less rigid than the material composing the cooling element. This would be obvious to do since a more rigid cooling unit would allow better attachment to the thermoelectric converting unit, resulting in a more compact exhaust heat power generating unit (paragraph [0075]). The result of this would be the cooling unit

has the highest rigidity among the group of the cooling unit, thermoelectric converting unit, and heat exchange unit, which is a limitation recited in Claim 1.

KATSUMI et al. teaches a heat exchange unit that includes a heat exchange fin for collecting the thermal energy of the exhaust gas (element 21 in Drawing 2) and a base (element 19 in Drawing 2) having one surface (element 19a in Drawing 2) attached to the heat collected fins (i.e., the heat exchange unit) and the other surface is in contact with the thermoelectric converting unit, which are limitations recited in Claim 2. KATSUMI et al. also teaches the exhaust pipe includes a main body that forms a frame of an exhaust passage, which is the inner shell (element 19 in Drawings 2 and 3), which is the base of the heat exchange unit, and the heat exchange fins are disposed therein (element 21 in Drawings 2 and 3); therefore, exhaust passage is constructed by the exhaust pipe and the heat exchange unit as they are one and the same (element 19 & 21 in Drawings 2 and 3), which are limitations recited in Claim 2. KATSUMI et al. teaches that heat exchange fins and base component are manufactured in the described embodiment from stainless steel (paragraph [0063]), but one of ordinary skill in the art would recognize that the heat exchange unit components can be fabricated from a number of different metals, including those that were less rigid than stainless steel (paragraph [0063]). Therefore, one skilled in the art could produce a base which is constructed from the most rigid material of all said components, which is a limitation recited in Claim 2. This would result in a sound



interface between the heat exchange unit and the thermoelectric conversion unit, enhancing the heat transfer from the former to the latter.

KATSUMI et al. teaches the main body of the exhaust pipe, i.e., the inner shell (element 19 in Drawings 2 and 3) can be formed from a number of metals to address thermal conductivity (paragraph [0063]), and therefore could be chosen to be constructed of a material with a thermal expansion ratio lower than the other component of the heat exchange unit, namely the heat collection fins (element 21 in Drawings 2 and 3). The main body of the exhaust pipe manufactured in the described embodiment from stainless steel (paragraph [0063]). These are limitations recited in Claims 3 and 4, respectively.

KATSUMI et al. teaches a configuration of the exhaust heat electrical generating apparatus where the heat exchange fins are configured in a plurality where some of the fins are disposed 180 degrees from each other (elements 21, 21a, and 21b in Drawings 3-7), i.e., they are disposed at a different pitch, which is a limitation recited in Claim 8.

KATSUMI et al. teaches that the heat exchanging fins (elements 21, 21a, and 21b in Drawings 3-7) can consists of two kinds of stainless steel plates (paragraph [0053]) that would inherently exhibit different heat conductivities, which is a limitation recited in Claim 9.

KATSUMI et al. teaches the main body of the exhaust pipe, i.e., the inner shell (element 19 in Drawings 2 and 3) and the heat exchange fins (element 21 in Drawings 2 and 3) can be formed from a number of metals and/or ceramic, so to

address endurance, thermal conductivity, and heat deformation (paragraph [0063]). Therefore, it would be obvious to one of ordinary skill to choose construction material to give a configuration where the heat exchange unit (i.e., heat collection fin) deformation would be in an opposite direction from an exhaust pipe deformation to keep proper spacing for heat exchange, which is the limitation recited in Claim 10.

12. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over KATSUMI et al. (Japanese Patent Publication H11-122960, A) as applied to claims 1-4 and 8-10, and further in view of KAZUHIKO et al. (Japanese Patent Publication H11-036981, A).

KATSUMI et al. discloses an exhaust heat electrical generating apparatus that recites the limitations of Claim 2 as stated above. KATSUMI et al. also teaches the exhaust pipe in the center of the apparatus (Drawing 2), the thermoelectric converting unit on the outer periphery of the heat exchange unit attached to the main body of the exhaust pipe (Drawing 2), and the cooling unit on the outer periphery of the thermoelectric converting unit (Drawing 2), which are limitations recited in Claim 5. KATSUMI et al. teaches the thermoelectric unit is formed by a plurality of thermoelectric units (element 33 and all like unlabeled elements, Drawing 2), which is a limitation recited in Claim 6.

KATSUMI et al. does not teach an elastic member on the outer side of the cooling unit, an elastic system, a unit of elastic system structured based on the

thermoelectric module, nor that the elastic member includes a spring and a compression member which are one of in point contact and line contact with each other.

However, KAZUHIKO et al. discloses an exhaust heat power generating device, wherein is taught elastic members on the outer side of the cooling unit (elements 100 and 110 in Drawing 7) and these members are part of a system for fixing the thermoelectric converting unit by applied pressure to the cooling unit externally by the elastic member (paragraph [0051]), which are limitations recited in Claim 5. KAZUHIKO et al. also teaches the elastic system is structured based on the module of the thermoelectric converting units as evidenced in Drawings 6 and 7, where elements 10b, 11b, 100b, and 110b represent “breakthroughs” corresponding to the plurality of thermoelectric elements, which is a limitation recited in Claim 6. KAZUHIKO et al. also teaches the elastic member includes a spring material and compression member in contact (paragraphs [0051] - [0053]), which is the limitation recited in Claim 7.

KATSUMI et al. and KAZUHIKO et al. are analogous art, in that they deal with the same technology area, thermoelectric exhaust gas power generators.

At the time of the present invention, it would have been obvious to one of ordinary skill in the art to modify the exhaust heat electrical generating apparatus of KATSUMI et al. with the elastic system elements of KAZUHIKO et al. because to do so allows any thermal expansion to be eased (KAZUHIKO et al., paragraph [0051]).

***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. CHRISTOPHER BALL whose telephone number is (571)270-5119. The examiner can normally be reached on Monday through Thursday, 8:00 am to 5:00 pm (EDT).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Barbara L. Gilliam/  
Supervisory Patent Examiner, Art  
Unit 4128

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